CLAIMS

WHAT IS CLAIMED IS:

1. A rotary engine, comprising:

a stationary cylinder internally comprising a first cavity, wherein an intake aperture and an exhaust aperture are located on a surface of the stationary cylinder for providing gas intake and exhaust in and out of the first cavity, and an ignition aperture is located on the surface of the stationary cylinder for providing combustion;

a rotational member coupled to an external drive source for generating rotation;

at least one rotational cylinder, having a second cavity and driven by the rotation of the rotational member, rotating inside the first cavity and sequentially passing by the intake aperture, the ignition aperture, and the exhaust aperture on the surface of the stationary cylinder, wherein the rotational cylinder also has a window on a surface for providing a channel to the intake aperture, the ignition aperture, and the exhaust aperture when the rotational cylinder rotates and passes by those apertures;

at least one swing piston corresponding to the rotational cylinder, placed in the second cavity and swinging within the second cavity for altering the volume of the intake/exhaust space of the second cavity to define the second cavity as a volume-variable intake/exhaust space; and

at least one driving member corresponding to the rotational cylinder driving the swing piston to swing within the second cavity of the rotational cylinder to match the position of the rotational cylinder during rotation.

2. The rotary engine in claim 1, wherein the rotational member is a driving disk coupled to a first shaft that is placed in the center of the stationary cylinder where the first shaft exposes from the stationary cylinder for coupling to the external driving source.

3. The rotary engine in claim 2, wherein the number of driving disks is two and the two driving disks are correspondingly coupled to the opposite side of the top and bottom part of the first cavity and the rotational cylinders are secured between the two driving disks.

4. The rotary engine in claim 3, wherein each rotational cylinder forms a group with one swing piston and two driving members that correspond to the top and bottom driving disks.

5. The rotary engine in claim 1, wherein the swing piston swings corresponding to the rotational position of the rotational cylinder, the intake/exhaust volume gradually increases as the rotational cylinder passes by the intake aperture, then the intake/exhaust volume gradually decreases as the rotational cylinder passes by the ignition aperture, and finally the intake/exhaust volume first gradually increases and then gradually decreases as the rotational cylinder passes by the exhaust aperture.

6. The rotary engine in claim 1, wherein a swing piston is secured to a second shaft that is inserted in the corresponding rotational cylinder and the second shaft is coupled to the driving members that drive the swing piston to swing in the second cavity.

7. The rotary engine in claim 1, wherein the driving member is a driving wheel assembly comprising a leading wheel set, a driven wheel set, and a connecting arm that couples the leading wheel set and the driven wheel set.

8. The rotary engine in claim 7, wherein the driven wheel set is coupled to the rotational cylinder for rotating in a circular orbit driven by the rotational member.

9. The rotary engine in claim 7, wherein an inner surface of the stationary cylinder comprises a closed non-circular track for accommodating the leading wheel set of the driving wheel assembly in the non-circular track and the leading wheel set rotates in the non-circular track driven by the rotational member.

10. The rotary engine in claim 7, wherein the stationary cylinder comprises a cover plate parallel to the inner surface of the stationary cylinder, the cover plate further comprising a non-circular track on the surface for accommodating the leading wheel set of the driving wheel assembly in the non-circular track and the leading wheel set rotates in the non-circular track driven by the rotational member.

11. The rotary engine in claim 9, wherein the closed non-circular track is an elliptic track.

12. The rotary engine in claim 10, wherein the closed non-circular track is an elliptic track.

13. The rotary engine in claim 7, wherein the leading wheel set is a set of a first wheel and a second wheel, where both wheels rotate about the same axle, the first wheel being in contact only with an outer surface of the non-circular track and the second wheel being in contact only with an inner surface of the non-circular track when the leading wheel set rotates in the non-circular track.

14. The rotary engine in claim 7, wherein the leading wheel set is an elongated cylinder.

15. The rotary engine in claim 1, wherein a surface of the rotational cylinder and a surface of the swing piston further comprise a plurality of seal guides for closing gaps among the swing piston, the rotational cylinder, and the stationary cylinder by thermal expansion of the seal guides to prevent gas leakage.

16. A rotary engine, comprising:

a stationary cylinder internally comprising a first cavity, wherein an intake aperture and an exhaust aperture are placed on a surface of the stationary cylinder for providing gas intake and exhaust in and out of the first cavity, an ignition aperture is placed on the surface of the stationary cylinder for providing combustion, and a closed non-circular track is placed on an inner surface of the stationary cylinder;

a first shaft, inserted in the stationary cylinder and exposed from the stationary cylinder for coupling to an external drive source;

a driving disk, coupled to the first shaft and accommodated in the first cavity, rotating within the first cavity and driven by the drive source;

at least one rotational cylinder, having a second cavity, coupled to a surface of the driving disk rotating within the first cavity about the first shaft driven by the driving disk, wherein a window is placed on a surface of the rotational cylinder for providing a channel to the intake aperture, the ignition aperture, and the exhaust aperture of the stationary cylinder when the rotational cylinder rotates and passes by those apertures;

at least one swing piston corresponding to the rotational cylinder, placed in the second cavity, coupled to a second shaft, and driven by the deflective rotation of the second shaft, swinging within the second cavity for altering the volume of the intake/exhaust space in the second cavity to define the second cavity as a volume-variable intake/exhaust space; and

at lease one driving wheel assembly corresponding to the rotational cylinder comprising a interconnected leading wheel set and driven wheel set, wherein the driven wheel set is coupled to the second shaft exposed from the driving disk and driven by the rotation of the driving disk to rotate in a circular orbit about the first shaft, the leading wheel set being accommodated and rotating inside the closed non-circular track on the inner surface of the stationary cylinder to drive the second shaft that is coupled to the driven wheel set to deflectively rotate within the second cavity for driving the swing piston to swing within the second cavity of the rotational cylinder to match the position of the rotational cylinder during rotation.

17. The rotary engine in claim 16, wherein the number of driving disks is two and the two driving disks are correspondingly coupled to the opposite sides of the top and bottom parts of the first cavity and the rotational cylinders are secured between the two driving disks.

18. The rotary engine in claim 17, wherein each rotational cylinder forms a group with one swing piston and two driving wheel assemblies that correspond to the top and bottom driving disks.

19. The rotary engine in claim 16, wherein the swing piston swings corresponding to the position of the rotational cylinder during rotation, the intake/exhaust volume gradually increases as the rotational cylinder passes by the intake aperture, the intake/exhaust volume gradually decreases as the rotational cylinder passes by the ignition aperture, and the intake/exhaust volume first gradually increases then gradually decreases as the rotational cylinder passes by the exhaust aperture.

20. The rotary engine in claim 16, wherein the stationary cylinder has a cover plate parallel to the driving disk for sealing the stationary cylinder in which the cover plate

has the closed non-circular track located on a surface of the cover plate.

21. The rotary engine in claim 16, wherein the leading wheel set comprises a first wheel and a second wheel, where both wheels rotate about the same axle, the first wheel being in contact only with an outer surface of the non-circular track and the second wheel being in contact only with the inner surface of the non-circular track when the leading wheel set rotates in the non-circular track.

22. The rotary engine in claim 16, wherein the leading wheel set is an elongated cylinder.

23. The rotary engine in claim 16, wherein the closed non-circular track is an elliptic track.

24. A rotary engine, comprising:

a stationary cylinder internally comprising a first cavity, wherein an intake aperture and an exhaust aperture are placed on a surface of the stationary cylinder for providing gas intake and exhaust in and out of the first cavity and an ignition aperture is placed on the surface of the stationary cylinder for providing combustion;

a first shaft inserted in the stationary cylinder exposed from the stationary cylinder for coupling to an external drive source, wherein at least a trench is provided on the surface of the first shaft;

a driving disk that is coupled to the first shaft and accommodated in the first cavity and rotating within the first cavity driven by the drive source;

at least one rotational cylinder, having a second cavity, rotating within the first cavity about the first shaft driven by the driving disk, wherein a window is placed on a surface of the rotational cylinder for providing a channel to the intake aperture, the ignition aperture, and the exhaust aperture of the stationary cylinder when the rotational cylinder rotates and passes by those apertures;

at least one swing piston corresponding to the rotational cylinder, placed in the second cavity, swinging within the second cavity for altering the volume of the intake/exhaust space of the second cavity to define the second cavity as a volume-variable intake/exhaust space;

at least one driving member corresponding to the rotational cylinder for driving the swing piston to swing within the second cavity of the rotational cylinder to match the position of the rotational cylinder during rotation; and

a lubrication device comprising at least an oil tank coupled to the first shaft, wherein centrifugal force, created by the rotation of the first shaft, sprays the lubricating oil from the oil tank along at least a trench placed on the surface of the first shaft, into the stationary cylinder for lubrication.

25. The rotary engine in claim 24, wherein the lubrication device comprises a lubrication oil collecting sump that is coupled to the stationary cylinder for draining the lubricating oil in the stationary cylinder to the lubrication oil collecting sump.

26. The rotary engine in claim 25, wherein the lubricating oil in the stationary cylinder is drained via oil draining holes on the surface of the stationary cylinder to the lubrication oil collecting sump.

27. The rotary engine in claim 25, wherein the lubrication oil collecting sump comprises a pump for pumping the lubricating oil in the lubrication oil collecting sump back to the oil tank that is coupled to the first shaft.

28. The rotary engine in claim 25, wherein the oil tank comprises a heat dissipating unit for cooling the lubricating oil from the lubrication oil collecting sump so that the lubricating oil may be reused after heat exchange.

29. The rotary engine in claim 25, wherein the rotational cylinders placed in the stationary cylinder are coupled to cylinder connecting partitions that rotate synchronously with the rotational cylinders for preventing lubricating oil which is in the stationary cylinder and sprayed from the first shaft, from entering the intake aperture, the exhaust aperture, and the ignition aperture, and wherein at least one oil-sweeping guide is located on the cylinder connecting partitions to increase the speed of draining the lubricating oil to the lubrication oil collecting sump.